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Clinical significance of uterine scar tenderness and third trimester sonographic scar thinning in predicting scar complications

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Abstract
Objective: To determine the clinical significance of uterine scar tenderness and sonographic scar thinning in predicting strength of scar in patients with lower segment cesarean section (LSCS).
Method: A prospective study was conducted over a period of one year in the department of Obstetrics and gynecology. Women undergoing LSCS with history of previous one LSCS were assessed for scar tenderness and; their third trimester's sonographic LUS scar thickness detail was noted. They were divided in two groups (A&B) on the basis of whether scar tenderness and/or sonographic scar thinning (< 3.5 mm) were present or not. Findings were correlated with intra-operative scar conditions.
Result: Study showed that out of 50 patients of group A, 23 patients had scar complications while 27 patients had no such complications. Out of 47 patients of group B, only 5 had scar complications, while in remaining 42 patients no scar complication was found intra-operatively.
Conclusion: Timely done caesarean section in pregnant woman with scar tenderness and/or thin third trimester sonographic scar can definitely bring down the neonatal and maternal morbidity and mortality.

Keywords: Lower segment cesarean section (LSCS), lower uterine segment (LUS), scar thinning, scar tenderness

Introduction

Cesarean Section is a common operative procedure in obstetric practice all over the world to ensure healthy outcome of the pregnancy for the mother and newborn. With the advent of modern anesthesia, antibiotics and availability of blood transfusions, the indications of this operation are being continually extended. Also with the implementation of modern technology in labor and neonatology units, the incidence of Cesarean Section has further increased to decrease feto-maternal morbidities and mortalities [1]. Internationally cesarean section rates vary from 10-30 percent [2]. Repeat cesarean section is the most common avoidable cause of rising CS rate [3, 4]. 10% of obstetric population has history of prior cesarean delivery globally [5].

Indian females are also facing the similar rate (10.6%) [2]. Vaginal birth after CS is one of the target foci to reduce the rising CS rate [2]. However vaginal birth after CS has probability of scar rupture, which is associated with feto-maternal morbidity and sometime mortality [2]. The incidence of cesarean scar complications ranges between 0.2% and 4.3% of all pregnancies with previous cesarean [5]. Baron J *et al.* [6], in their study done in 2014 predicted incidence of scar dehiscence between 0.2% and 4.3%.

It has been seen that scar dehiscence is asymptomatic in 48% of women and if not taken for LSCS then it may end up in uterine rupture [7-9]. Scar rupture can be predicted by using obstetric risk assessment before trial of scar using continuous cardio tocographic monitoring, continuous monitoring of maternal pulse by pulse oxymeter and ultrasound assessment of cesarean uterine scar in third trimester of pregnancy [10, 11]. Abnormal cardio tocograph is most consistent finding of impending cesarean scar rupture, present in 80 percent of women with scar rupture [5]. Clinical features of scar rupture are maternal tachycardia, severe abdominal pain present even in between uterine contractions, scar tenderness and abnormal vaginal bleeding. Late sign include cessation of uterine activity, hematurea, recession of presenting part and maternal shock [12].

Technique of third trimester LUS thickness measurement by sonography has been described by several authors [13-15]. Bujold *et al.* [14] suggested LUS thickness measurement using trans-abdominal and trans-vaginal ultrasound between 35±0 and 37±6 weeks gestation for

fetus with cephalic presentation. Sonographically, LUS is a two layer structure that consists of a hyper echogenic layer (with bladder wall) and a hypo echogenic layer (myometrial layer). LUS view appears clear with patient's full bladder. To measure LUS, one caliper is placed at interface between urine and the bladder wall and second is placed between amniotic fluid (or fetal scalp) and the decidua. Many studies had shown that at least three measurements should be taken, with the lowest value being retained [14, 15]. Ejub Basic *et al*. [11], in their study in 2012 found that the cut off thickness of previous caesarean scar was 3.5 mm for allowing a successful vaginal delivery. In our study we measured scar thickness using trans-abdominal ultrasound that was done in third trimester. If thickness was less than 3.5 mm, it was taken as scar thinning. Among all the features listed above, scar tenderness and third trimester sonographic scar thinning, if taken together, are best predictors of scar rupture.

Methodology

A prospective study was conducted over a period of one year in the Department of Obstetrics and Gynecology at Jaipur National University Institute of Medical Sciences and Research Center.Clearance from institutional ethics committee taken.

Inclusion criteria: All pregnant patients with gestation age more than 28 weeks (old period of viability) with past history of one lower segment cesarean section were included.

Exclusion criteria: All pregnant patients with less than 28 weeks pregnancy, primigravida, all multi gravida with past history of two or more lower segment cesarean section and all pregnant patients with past history of one classical cesarean section were excluded.

Women undergoing LSCS, whether emergency or elective with history of previous one lower segment cesarean section, were assessed for scar tenderness and their third trimester's sonographic LUS scar thickness detail was noted. Cases were examined for scar tenderness immediately, before surgery. Senior registrar or assistant professor conducted the examination. Scar tenderness was checked by superficial palpation of the lower uterine segment by pressing the lower abdomen just above the symphysis pubis in the absence of uterine contraction. To remove bias, diversion technique was used. A visible wince was regarded as positive sign.

Cases were divided into two groups (Group A and Group B) on the basis of whether scar tenderness and/or sonographic scar thinning (less than 3.5 mm) were present or not. Findings were correlated with intra-operative scar conditions, whether scar rupture, scar dehiscence or scar thinning was present. Scar rupture was defined by giving way of the scar with the fetus in the abdominal cavity. Dehiscence was defined as a defect in the lower uterine segment at the scar site with fetus inside the uterus and thin scar was defined as a thin intact scar on lower uterine segment with thickness less than 3.5 mm. Details of maternal outcome in the form of duration of hospital stay, blood transfusion and infection were noted. Neonatal outcome in the form of still birth and neonatal death was recorded.

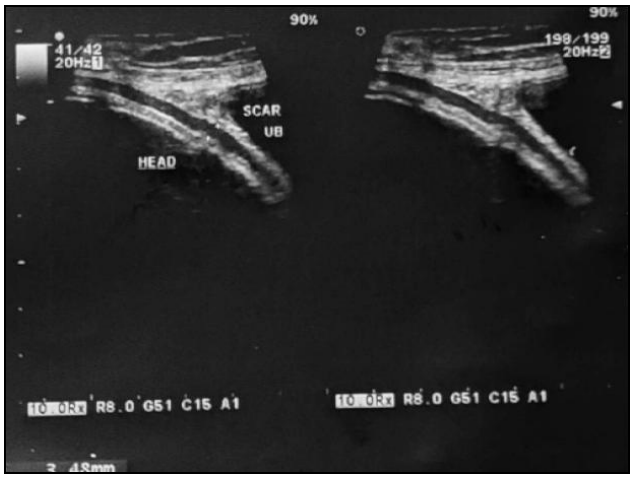

Fig 1: Sonography of pregnant patient (at 36 weeks of pregnancy having scar tenderness) with scar thickness of 3.48 mm.

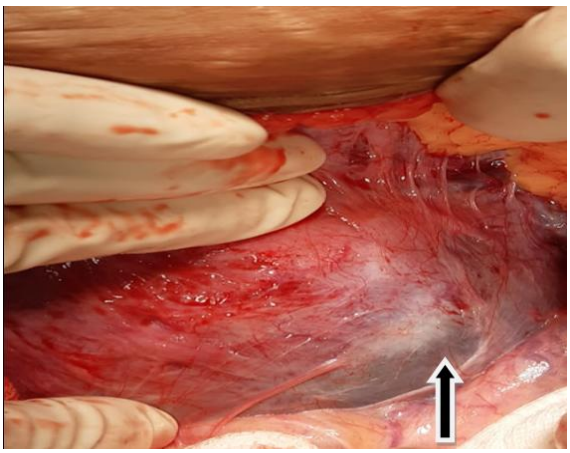

Fig 2: LSCS of same patient after 48 hours (dexamethsone coverage) showing thinned out lower uterine segment (scar thinning).

Observation

Table 1: Age of patients

	Group-A (50)		Group-B (47)	
Age In Yrs	**No. of patients**	**%**	**No. of patients**	**%**
<=20	3	6%	0	0%
21-25	31	62%	31	65.95%
26-30	12	24%	10	21.27%
31-35	3	6%	6	12.70%
36-40	1	2%	0	0%
>=41	0	0%	0	0%

Table 2: Gestational age of patients

	Group-A(50)		Group-B(47)	
G. Age	**No. of patients**	**%**	**No. of patients**	**%**
<=32	1	2%	3	6.38%
33	0	0%	0	0%
34	2	4%	2	4.25%
35	2	4%	1	2.12%
36	11	22%	5	10.63%
37	8	16%	2	4.25%
38	14	28%	19	25.33%
39	7	14%	10	21.21%
>=40	5	10%	5	10.63%

Table 3: Relationship of scar tenderness and/or sonographic scar thinning with scar complications.

		Scar Complications		
		Yes	**No**	**Total**
Scar tenderness and/or Sonographic scar thinning	Yes	23	27	50
	NO	5	42	47
	Total	28	69	97

Table 4: Post LSCS hospital stay of patients.

	Group-A(50)		Group-B(47)	
Hospital stay of Patients in days	**No. of patients**	**%**	**No. of patients**	**%**
4	1	2%	1	2.12%
5	2	4%	3	6.38%
6	6	12%	4	8,51%
7	10	20%	13	27.65%
8	23	46%	17	36.17%
9	3	6%	5	10.63%
10	0	0%	0	0%
11	2	4%	0	0%
12	2	4%	1	2.12%
13	1	2%	0	0%

Result

In our study 97 patients had previous one cesarean section. These 97 patients were divided into two groups: group A (50 patients) and group B (47 patients), depending on presence or absence of scar tenderness and/or third trimester sonographic scar thinning.

Table 1 showed that most of the patients were from the age group of 21-25 years. 62% were in group A and 65.9% were present in group B. Table 2 showed that mean gestational age in both groups was 38 weeks.

Table 3 showed that in group A, 23 patients had scar complications in the form of scar thinning (20), scar dehiscence (3), scar rupture (none), while 27 patients had no such complications. In group B, only 5 patients presented with scar thinning, while in remaining 42 patients no scar complication was found intra operatively. Sensitivity, specificity, positive predictive value and negative predictive value of the test were 82.14%, 60.86%, 46% and 89.36% respectively. False positive were 17.85% and false negative cases were found to be 39.13%.

Table 4 showed that near about 80% patients were discharged from hospital after stitches removal and their maximum stay was of 9 days. Rest of the patients (6 in group A and 1 in group B) got discharged after 9 days. Maximum hospital stay was 13 days in both the group because of wound infection. No maternal death was recorded. Blood transfusion was given in 4 patients in group A (intra-operative bleeding was more than average) and one in group B (preterm LSCS was done for APH-placenta previa).

Discussion

Scar tenderness is an easily elicitable sign which appears early, and along with third trimester sonographic scar thickness (both in low resource settings where continuous electronic fetal heart rate monitoring is not available), are more useful in predicting scar complications.

Table 1 showed that most common age group in both groups (A&B) was 21-25 years, similar to the findings as seen in the study by Safia Khalil and Gupta N *et al.* [2, 16]**.** In our study mean gestational age was 38 weeks, similar to Safia Khalil's study [2]. In the study done by Gupta N *et al.* [16], out of 120 cases, intra operative scar was intact in 69 cases (57.7%); scar was thinned out in 27 cases (22.5%); scar dehiscence was found in 21 cases (17.5%) and rupture was found in 3 cases (2.5%).

In the study conducted by Safia Khalil *et al.* [2], the subjects were divided into two groups on the basis of whether scar tenderness was positive or not. Group one included 37 women (27.5%). Rest of the 114 (75.4%) women constituted group two in whom scar tenderness was negative. In group one, 8 (21.6%) patients had thinned out lower uterine segment, 9 (24.3%) had scar dehiscence and 2 (5.4%) had uterine scar rupture. The estimated prevalence value was 14.5%. The sensitivity was 86.3% and specificity was 86.0%. False positives were 48.6% and false negatives were 2.6%. Positive predictive value was 51.3% and negative predictive value was 97.3%.

In another study done by Gaikawad *et al.* [5], they recorded operative findings in 78 women operated for suspected scar tenderness .They found scar rupture in 3 (3.8%), scar dehiscence in 9 (11.5%), thin scar (<4mm) but intact in 14 (17.9%) and normal scar in 52 (66.7%) patients. Sensitivity and specificity of scar tenderness in their study were 92.3% and. 8.3% respectively. The possible reason of low specificity was estimated to be that women who were false negative for scar tenderness were not included in their study.

In the study by Tyagi N *et al.* [17], scar tenderness was present in all the women who had intra- operative scar dehiscence. This proved that scar tenderness was a very strong predictor of scar dehiscence and should be taken seriously. In this study scar dehiscence was found in 35% of patients when scar thickness was less than 2 mm and only 5% of patients had scar dehiscence when scar thickness was more than 3.5 mm. This implied that lesser is the scar thickness detected on ultrasound before cesarean, more is the risk of scar dehiscence in the patients. Incidence of scar dehiscence was 8.3% in this study. Baron J *et al.* [6] in their study predicted incidence of scar dehiscence between 0.2% and 4.3%. At Sir Salimullah Medical College and Mirrors Hospital, a rising trend of LSCS rates were noted from 12.3% in 1984 to 28.15% in 1992 [18]. Puri *et al.* reported scar tenderness in 12 women (out of 205) and among these, four had intra-operative scar dehiscence [19].

In another study conducted on 120 women, 3 cases of scar tenderness were reported and only one had ruptured uterus at LSCS [20]. A retrospective study of 99 women reported scar tenderness in one woman while one case of scar dehiscence did not have scar tenderness [21].

Rubina *et al.* in a study of 120 women found three cases of scar tenderness of which one had a ruptured uterus at cesarean [20]. Studies using a trans-abdominal approach reported greater cut-off values than those using a trans-vaginal approach for the prediction of uterine scar dehiscence [14, 22].

In a study conducted by Gotoh *et al.* [15], it was found that there might be incomplete uterine rupture at delivery when LUS thickness at trans-vaginal ultrasonography was less than 2mm within 1week of delivery, with positive predictive value of

73.9% and negative predictive value of 100%.

In our study positive predictive value was 46% and negative predictive value was 89.36%. Lower value could be because of inclusion of third trimester sonographic scar thickness and not within 1 week of delivery

Many experts suggest that a combination of both approaches is probably the best way to measure LUS thickness. Trans-abdominal sonography can detect scar defect located high on the LUS, which are seen in those women who had a previous cesarean section performed in early gestation period and/or before labor, while trans-vaginal sonography is probably the best approach to visualize scar defects located in the lowest part of the LUS, seen in those women whose prior cesarean section was performed in the first or in the second stage of labor [23]. Most authors suggest that at least three measurements should be taken, with the lowest value being retained [14, 15].

N Singh *et al*. [24] in their study found that scar thickness less than 2 mm in third trimester was associated with scar dehiscence. Ejub Basic *et al*. [11], in their study found the cut off thickness of previous caesarean scar to be 3.5 mm for allowing a successful vaginal delivery.

In our study false negatives were reported to be 17.85%. This could possibly be due to early third trimester sonographic findings showing scar thickness more than 3.5mm. If sonography would have been repeated in late third trimester or within one or two weeks of delivery, thin scar could have been reported. In the false negative cases, scar tenderness was also not reported. This could have been missed due to other factors favoring elective cesarean section, for example, placenta previa, breech presentation, short stature, etc. 39.13% of cases were false positives, most probably due to the presence of intra-operative adhesion between bladder and LUS. This could possibly conceal the thinned out LUS which actually was present but hidden behind bladder adhesions. In our study by using two predictors (scar tenderness and scar thinning) and taking timely decision for LSCS, scar rupture was not found in any case, thus preventing near miss maternal mortality and its concequences in the form of neonatal mortality.

In the study done by Gupta N *et al*. [16] no maternal death was recorded. Average hospital stay was 6 days. Blood transfusion was given in 23 (11.67%) patients. In their study fresh still births were reported to be 2 (1.60%), neonatal deaths to be 1 (0.83%) and NICU admissions were 14 (11.67%).

In our study no fresh still births were reported. One neonatal death in group A (due to severe respiratory distress) and one in group B (prematurity and its complications and LSCS done for APH) were recorded.

Conclusion

In modern obstetrics, caesarean section is a major operative procedure and this has significant contribution in bringing down the maternal and neonatal mortality and morbidity. Credit as given to improved surgical skills and modern anesthesia; also the contribution of transport system in rural and remote area could not be ignored. Timely done caesarean section in woman with scar tenderness and/or thin (3.5mm) late third trimester (or within 1 week of delivery) sonographic scar will definitely bring down the neonatal and maternal morbidity and mortality thereby, decreasing the number of emergency Caesarean section (for scar rupture)/obstetric hysterectomy (for traumatic intrapartum hemorrhage)/asphyxiated neonate delivered by difficult vaginal delivery. If the feto-maternal outcome improves at the cost of an abdominal & uterine scar we should not criticize it. Mental trauma to a family having a mentally retarded or a cerebral palsy child (due to difficult vaginal delivery) with mental and/or physical handicaps; hysterectomies in a woman and lost life of mother and/or child cannot be compensated whereas abdominal and uterine scar can heal in time.

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